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# Development of location tracking system via short message service (SMS) based on GPS unblox neo-6m and sim 800l module



# Development of location tracking system via short message service (SMS) based on GPS unblox neo-6m and sim 800l module

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**Abstract**. The development of technology has increasingly sophisticated and has a positive influence on human life. The location tracking system that is currently overgrowing in the world of technology is required to be able to serve consumers until consumers can benefit from the technology. Given the number of thefts in Indonesia is currently increasing and the need for a security system that can work continuously automatically. Therefore, the purpose of this research is to make the location tracking system as expected by the community. Based on the testing that has been done on the tool and see the purpose of this research, it can be concluded that this tool has been tested and can be used to help secure systems to track valuable tools such as motorcycles, bags, cars, etc. based on Global Positioning System (GPS) coordinates sent by SIM 800L module to numbers destination of cellphone.

## 1. Introduction

Security is essential and can be taken into consideration in life.Every human being needs security guarantees for the activities carried out. Various types of development in the field of technology are directed to provide or improve security in human life. Nowadays there are much loss of valuables and cause difficulties in the search because of very minimal instructions. In Indonesia alone, the number of a crime of theft of goods increases annually can be seen from the following data: theft in 2011 (10,097 crime), 2012 (10,672 crime), 2013 (10,683 crime) [1]. Many methods for searching for lost items. The conventional method is to do a manual search, namely by contacting the information, or the police, or searching directly. If the loss is a cellular item, one other method is to dial the cell phone number. However, it is improbable to be found because the number must have been deactivated if in the case of theft. The latest method is to use GPS technology that will tell the owner of the object's location.

Global Positioning System or often abbreviated as GPS is a location-determining technology that is widely used today. GPS is a radio navigation system that determines the location using satellites[2][3]. This GPS system can monitor and find out the location of an object to be known anywhere on the entire surface GPS systems can be used by anyone for free, provided they have the necessary equipment and software. Many applications can be developed with this GPS system, including applications that can help to monitor (track) motor vehicles. Using GPS technology makes it possible to follow the vehicle trail and support notifications to be able to follow the latest vehicle and travel information [4].

GSM modem a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone[5]. One of the devices used is GSM / GPRS SIM 800L which is designed on a tracking system using SMS that runs on Android. Android-based devices have become a mobile operating system that is very popular in recent years. This is due to Android, equipped with a variety of capabilities that are capable of starting multimedia capabilities to its ability to adapt to the work of the client-server system.[6]

Arduino Pro Mini is a Microcontroller technology that is currently developing can be used to create a tracking system with an 800L SIM via SMS sent by users via a cellphone. Arduino pro mini is In this mini project task the author examines the tracking device system that can be tracked via cell phone using SMS with specific codes that can be read by the device itself.

Based on the background above, this study aims to design a security system with a title " Development of Locator Tracking System via Short Massage Services (SMS) Based on GPS UNBLOX NEO-6M and SIM 800L module"

## 2. Literature Review

The research by Agung Perdananto from Pamulang University Jakarta with the title "Tracking System using GPS Tracker for Android Phones" discusses the creation of Tracking Systems using GPS Tracker by making tracking system applications on Android-based gadgets with tracker type TK102 using Java Eclipse programming language. Running starts by inserting the SIM card and battery in place[4].

Research by Widyantara et al. Entitled "Application of GPS Tracker Technology for Identification of Highway Traffic Conditions" discusses real-time tracking system technology with the integration of 3 (three) technologies namely global positioning system (GPS), database technology such as geographic information system (GIS ) and cellular telecommunications technology such as general packet radio service (GPRS)[7].

Research by Rusnandar et al. from Ahmad Dahlan University Yogyakarta with the title "Opengts-Based Vehicle Tracking System" discusses the location-based vehicle tracking system to assist in the supervision and security of vehicles in a company or agency.[3]

The study by Ibn Ziad of Sriwijaya State Polytechnic with the title "Location Tracking Design with GPS Technology" discusses understanding GPS design as a location tracker. In this research, GPS is placed on a helmet. This helmet is used as a substitute for motorized vehicles [8].

## 3. Methods

Design of location tracking device, the first step is to make the box as a container for the components of the automatic key made of plywood board. For the creation of the box can be seen in the following picture:

**Figure 1.** Desult of Design (a) Look Inside and (b) Look Outside.

### *3.1 Result of Design Electronic Locator Tracking System.*

#### *3.1.1 Wiring Design on Ublox NEO-6M GPS Module.*

The wiring design phase of the GPS module, the GPS Module pin is connected to the Arduino Pro Mini pin with a single cable, the following is an explanation of the interconnected pins:

a. VCC pin of a sensor is connected to the 5 V Arduino pin.
b. GND pin of a sensor is connected to the Arduino GND pin.
c. GPS RX pin is connected to the Arduino Pro Mini TX pin.
d. GPS TX pin is connected to the Arduino Pro Mini RX pin

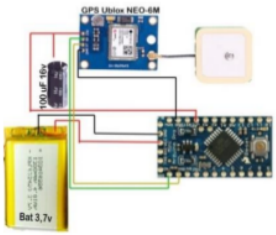


**Figure 2.** Wiring Design on Ublox NEO-6M GPS Module.

*3.1.2 Wiring Design on LCD*

the design of LCD wiring that is done is to connect the LCD pins with the Arduino pin using the following jumper cable, an explanation of the interconnected pins :

a. VSS pin of LCD is connected to the GND Arduino pin.
b. VDD pin of LCD is connected to the 5V Arduino pin.
c. VO pin of LCD is connected to the Arduino GND pin which is first given the resistance of 560 Ohm.
d. RS pin of LCD is connected to the 12 pins Arduino.
e. RW pin of LCD is connected to GND Arduino pin.
f. E pin of LCD is connected with pin 11 Arduino. Where the E (Enable) pin must be HIGH so that the LCD can be accessed.
g. D4 pin of LCD is connected to 9 pins of Arduino. D4 pin of LCD as a data bus.
h. D5 pin of LCD is connected to 6 pins of Arduino. D5 pin of LCD as a data *bus*.
i. D6 pin of LCD is connected to 5 pins of Arduino. D6 pin of LCD as a data *bus*.
j. D7 pin of LCD is connected to 4 pins of Arduino. D7 pin of LCD as a data *bus*.
k. A pin of LCD is connected to the 5V pin of Arduino was given resistance of 220Ω. A pin of LCD is a positive power supply of screen.
l. K pin of LCD is connected to GND pin of Arduino. K pin of LCD is a negative power supply of screen.

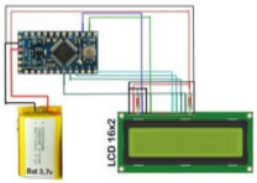


**Figure 3.** Wiring Design of LCD to the Arduino Mini Pro.

*3.1.3 Wiring Design on SIM 800L and LM2596*.

The Stage SIM 800L pins are connected to the power supply LM2596 DC-DC converter and Arduino pro mini. The following is an explanation of the pins connected:

a. VCC of SIM 800L is connected to the positive *Output* LM 2596
b. GND of SIM 800L is connected to the negative *Output* LM 2596 and *ground* of Arduino.
c. The positive and negative input of LM 2596 is connected to batteries 9V.
d. RX pin of SIM 800L is connected to the eight pins of Arduino pro mini.
e. TX pin of SIM 800L is connected to the *seven* pins of Arduino Pro Mini.

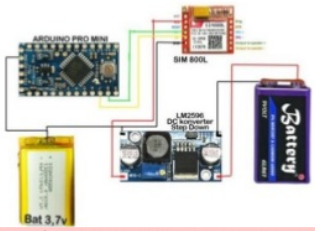


**Figure 4.** *Wiring Schematic* on SIM 800L

*3.1.4 Wiring Design on Arduino Pro Mini.*

Most important in the locator tracking system is Arduino. Because Arduino is the main component as well as the brain or controller of the system. At this stage, all supporting components are connected to Arduino.

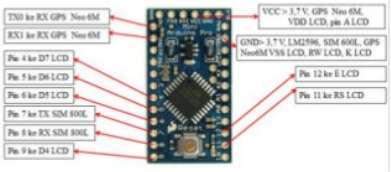


**Figure 5.** *Wiring* Schematic on Arduino Pro Mini.

## 4. Result and Discussion

This section will discuss the testing of the performance of the GPS Tracker tool that has been made. This tool is tested based on messages sent to cell phones, messages with Google Maps addresses when GPS does not receive signals, messages when GPS receives signals and messages when the tracking device is reset via SMS.

### *4.1 Testing Based on the SMS sent by the 800L SIM*

#### *4.1.1 First message when the tracking device is turned on*

The first message sent by the tracking device when the GPS is turned on is "GPS ONLINE TRACKER," and the LCD will also display "ONLINE GPS." This first message is only sent to the mobile number that has been entered into the program. The following is a picture when the tracking device has sent a message to the mobile phone screen:


**Figure 6.** First Message when Location Tracking Tool Is Turned On


**Figure 7.** LCD when Location Tracking Tool is turned on

*4.1.2 States of GPS module does not receive a signal when it is tracked.*

To tracking the object is sending a message with the code "track" to the location tracking object, then the tracking device will send a message in the form of a Google Maps address. If the GPS module does not receive coordinate signals, the message sent to the cell phone will be an address that does not have coordinates as shown below:


(a) (b)

**Figure 8.** The message entered when the GPS Module does not receive a signal

*4.1.3 State of the GPS module receives coordinate signals*

Ublox NEO-6M GPS module can receive coordinates when the indicator light on the module blinks, at that time the GPS has the location of the coordinates where the device is located. When tracking the location of the device when GPS is active, the message sent to the cell phone is a Google Maps address that has been had the actual coordinate position. Here is the picture when the message sent is the location of the tracking device.


(a) (b)

**Figure 9.** (a) Coordinate Messages of the tracking device and (b) Location on Google Maps application

**Figure 10.** LCD when receiving and sending SMS coordinates

*4.1.4 State of reset condition to the location tracking device.*

When a reset condition, Arduino Pro Mini is starting executing the program from the beginning. So, the message is sent back to the cell phone with the word "GPS TRACKER RESET," after that again displays the message "GPS TRACKER ONLINE" on the LCD. The way to reset the message tracking tool is to send a message to the number in the tool with the code "reset." The following is a picture when the locator tracking system is reset:


**Figure 11.** Device Status after reset

## 5. Conclusions

Based on the previous descriptions it can be concluded:

a. The design of this tool can be applied with the ability to track location. The location of the coordinates obtained by the tracking device is sent via SMS by an 800L SIM. The message sent in the form of a Google Maps address can be directly accessed via the internet. This tool can be used as a learning media for students who have creative ideas so that they can create more innovative safety system tools.
b. The ability of the Ublox Neo 6-M GPS module in capturing parallel signals depends on the location where the tracking device is located. Coordinates are easy to obtain if the location of the device is outdoors. If the device is in the room, it will be challenging to get coordinate signals.
c. The ability of the Ublox Neo 6-M GPS module in capturing parallel signals depends on the location where the tracking device is located. Coordinates are easy to obtain if the location of the device is outdoors. If the device is in the room, it will be challenging to get coordinate signals.
d. The way to track a device is from a mobile phone, that is by texting the "track" code to the device number, the tracking device will send coordinates in the form of a Google Maps address.
e. This tool can be implemented on valuable devices or items such as bags, motorbikes and other valuable devices that are vulnerable to being lost.
f. The location tracking system is elementary to use, namely merely texting "track" to the device number, the tracking device will send its coordinates via an SMS message.

## Suggestion

a. When starting to turn on the tracking device, the coordinates received from the Ublox Neo 6-M GPS module are long enough in the room, so it needs to wait a few minutes. So it is not recommended to place a tracking device in the room.

b. Location tracking devices have two large batteries so that the size and weight of the tool increases, it is recommended to use a small battery with the appropriate voltage.

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